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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,283	10/18/2005	Guillaume Bouche	61170-00022USPX	1856

32914 7590 12/21/2007
GARDERE WYNNE SEWELL LLP
INTELLECTUAL PROPERTY SECTION
3000 THANKSGIVING TOWER
1601 ELM ST
DALLAS, TX 75201-4761

EXAMINER	
DOUGHERTY, THOMAS M	

ART UNIT	PAPER NUMBER
2834	

MAIL DATE	DELIVERY MODE
12/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/537,283	BOUCHE ET AL.	
	Examiner	Art Unit	
	Thomas M. Dougherty	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-11,16,17,19-22 and 29-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-7,10,11,16,17,19 and 22* is/are rejected.

7)☒ Claim(s) *8,9,20,21 and 29-33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Remarks

The Applicants' contention that Kuramasu is not combinable with the Barber et al. and Inoue references is not persuasive. The Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. *In re Nomiya*, 184 UPQ 607 (CCPA 1975). However there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. *In re McLaughlin*, 170 USPQ 209 (CCPS 1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. *In re Bozek*, 163 USPQ 545 (CCPA) 1969, in this case the suggestions are noted below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5, 6, 7, 10, 11, 16, 17, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barber et al. (EP 1 158 671 A1) in view of Kuramasu et al. (JP-9-275323). Barber et al. show (e.g. fig. 2) a support

for an acoustic resonator, comprising: at least one bilayer assembly comprising: a layer of high acoustic impedance material (130d); and a layer of low acoustic impedance material (135d) made of a low electrical permittivity material.

The electrical permittivity of the low acoustic impedance material (135d) is less than about 4. Note that the relative permittivity of SiO_2 is 3.9. See conclusion below.

The support comprises no more than two bilayer assemblies. See fig. 3.

The high acoustic impedance material comprises at least one material selected from the group consisting of: **aluminum nitride** (130d in fig. 2), copper, nickel, tungsten, gold, platinum, molybdenum.

Barber et al. show (e.g. fig. 1) an acoustic resonator comprising: an active element (110) and a support (see figs. 2-4) having at least one bilayer assembly comprising: a layer of high acoustic impedance material (130d) and a layer of low acoustic impedance material (135d) made of a low electrical permittivity material.

The active element comprises at least one piezoelectric layer (110) placed between electrodes (105, 115).

The electrical permittivity of the low acoustic impedance material (135d) is less than about 4. Note that the relative permittivity of SiO_2 is 3.9. See conclusion below.

The high acoustic impedance material comprises at least one material selected from the group consisting of: **aluminum nitride** (130d in fig. 2), copper, nickel, tungsten, gold, platinum, molybdenum.

The support comprises no more than two bilayer assemblies. See fig. 3. Given the inventions of both Barber et al. and Inoue, neither shows use of a material whose relative electrical permittivity is less than about 2.5 or less than about 3, and whose low acoustic impedance material comprises SiOC.

Given the invention of both Barber et al., they do not show use of a material whose relative electrical permittivity is less than about 2.5 or less than about 3, and whose low acoustic impedance material comprises SiOC.

Kuramasu et al. show use of SiOC, a low acoustic impedance material, wherein the relative electrical permittivity of the low acoustic impedance material is less than about 2.5 and thus less than about 3 in a piezoelectric resonator structure.

Kuramasu et al. don't show a bilayer of low acoustic impedance material and high acoustic impedance material. However they do teach the interchangeability of the materials by noting optionally that either silicon oxide or silicon oxide carbide can be employed.

It would have been obvious to one having ordinary skill in the art to employ the silicon oxide carbide film of Kuramasu et al. for the silicon oxide film of either Barber et al. or Inoue at the times of either invention since these materials are known for their similar properties and one may obviously be substituted for the other as Kuramasu et al. teach. Additionally, it would have been obvious to one having ordinary skill in the art at the time either of the Barber et al. or Inoue inventions were made to employ SiOC in place of their silicon oxide since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended

use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Claims 1-3, 5-7, 10, 11, 16, 17, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue (US 2005/0093399) in view of Kuramasu et al. (JP 9-275323). Inoue shows (fig. 1) a support for an acoustic resonator, comprising: at least one bilayer assembly comprising: a layer of high acoustic impedance material (111); and a layer of low acoustic impedance material (112) made of a low electrical permittivity material.

The electrical permittivity of the low acoustic impedance material (112) is less than about 4. Note that Inoue indicates the permittivity as being 4.29 at paragraph [0036] that is at least about 4.

The support comprises no more than two bilayer assemblies. See claim 2.

The high acoustic impedance material comprises at least one material selected from the group consisting of: **aluminum nitride** (111), copper, nickel, tungsten, gold, platinum, molybdenum.

Inoue shows (e.g. fig. 1) an acoustic resonator comprising: an active element (103) and a support (110) having at least one bilayer assembly comprising: a layer of high acoustic impedance material (111) and a layer of low acoustic impedance material (112) made of a low electrical permittivity material.

The active element comprises at least one piezoelectric layer (103) placed between electrodes (102, 104).

The electrical permittivity of the low acoustic impedance material (112) is less than about 4. Note that Inoue indicates the permittivity as being 4.29 at paragraph

[0036] that is at least about 4.

The high acoustic impedance material comprises at least one material selected from the group consisting of: **aluminum nitride** (111), copper, nickel, tungsten, gold, platinum, molybdenum.

The support comprises no more than two bilayer assemblies. See claim 2. Given the inventions of both Barber et al. and Inoue, neither shows use of a material whose relative electrical permittivity is less than about 2.5 or less than about 3, and whose low acoustic impedance material comprises SiOC.

Given the invention of Inoue, he does not show use of a material whose relative electrical permittivity is less than about 2.5 or less than about 3, and whose low acoustic impedance material comprises SiOC.

Kuramasu et al. show use of SiOC, a low acoustic impedance material, wherein the relative electrical permittivity of the low acoustic impedance material is less than about 2.5 and thus less than about 3 in a piezoelectric resonator structure.

Kuramasu et al. don't show a bilayer of low acoustic impedance material and high acoustic impedance material. However they do teach the interchangeability of the materials by noting optionally that either silicon oxide or silicon oxide carbide can be employed.

It would have been obvious to one having ordinary skill in the art to employ the silicon oxide carbide film of Kuramasu et al. for the silicon oxide film of either Barber et al. or Inoue at the times of either invention since these materials are known for their similar properties and one may obviously be substituted for the other as Kuramasu et al.

teach. Additionally, it would have been obvious to one having ordinary skill in the art at the time either of the Barber et al. or Inoue inventions were made to employ SiOC in place of their silicon oxide since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Allowable Subject Matter

Claims 8, 9, 20, 21 and 29-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art does not show nor fairly suggest high and low impedance materials in a bilayer arrangement in a support for an acoustic resonator wherein the low acoustic impedance material comprises SiOC wherein the high acoustic impedance material has a thickness of between 0.3 and 3.2 μm and the layer of low acoustic impedance material has a thickness of less than 0.7 μm, preferably between 0.3 and 0.7 μm.

The prior art does not show nor fairly suggest high and low impedance materials in a bilayer arrangement in a support for an acoustic resonator wherein the low acoustic impedance material comprises SiOC wherein the layer of high acoustic impedance material rests on an interconnect layer of an integrated circuit, the layer of high acoustic impedance material being formed of a conductive material used in making interconnect layers of the integrated circuit.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In addition to the prior art cited in the first office action note that Laxman et al. (US 2002/0172766) teach use of porous SiOC as a low-electrical-permettivity material in their abstract.

Direct inquiry to Examiner Dougherty at (571) 272-2022.

tmd

December 13, 2007

TOM DOUGHERTY
PRIMARY EXAMINER